APPENDIX B

METHODOLOGY FOR ESTIMATING OUTSIDE PLANT COSTS

I. Introduction

1. Section II in this appendix explains in specific detail the regression equations and the adjustments to these equations for estimating the input values adopted in this Order for structure and cable costs. These regression equations and these adjustments are set forth in this appendix on the following tables: Table I., labeled "Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs;" Table II., labeled "Adjustments To Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs;" and Table III., labeled "Regression Equations Derived From Non-Rural LEC Data For Estimating Cable Costs."

2. Section III illustrates use of the Huber methodology to derive reasonable estimates for 24-gauge aerial copper cable costs.[1] This illustration uses the diagram in this appendix labeled "Scatter Diagram Of 24-Gauge Aerial Copper Cable Cost And Size With The Huber Regression Line." This diagram shows RUS cable cost observations for 24-gauge aerial copper cable and the regression line fit to these observations by using the Huber methodology. It also uses the frequency distribution in this appendix set forth on Table IV., labeled "Frequency Distribution Of Huber Weights For 24-gauge Aerial Copper Cable Cost." This frequency distribution shows the number of aerial copper cable observations to which the Huber methodology assigns particular weights.

3. Section IV demonstrates that the Huber methodology generally does not have a statistically significant impact on the level of the material costs reflected in the cable cost estimates adopted in this Order. This finding provides support for the large LEC buying power adjustment reflected in these estimates. This finding is supported by the statistical information set forth in this appendix on Table V., labeled "Analysis Of Coefficient For Cable Size Variable In The Huber Regression Equations."

II. Regression Equations For Estimating Outside Plant Structure Costs

A. Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs

4. Table I, labeled "Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs," sets forth the regression equations adopted in this Order for estimating the cost of: (1) 24-gauge aerial copper cable; (2) 24-gauge underground copper cable; (3) 24-gauge buried copper cable and structure; (4) aerial fiber cable; (5) underground fiber cable; (6) buried fiber cable

[1] We used Stata Statistical Software: Release 5 (Stata) to perform the calculations needed to estimate the regression equations adopted in this Order for cable and structure costs. Stata has a robust regression methodology that uses formulas developed by P. J. Huber, R. D. Cook, A. E. Beaton and J. W. Tukey. We used this methodology to estimate the regression equations for cable and structure costs. We refer to this regression methodology as the Huber methodology. *See* StataCorp., *Stata Reference Manual, Release 5*, vol. 3, P-Z, 168-173 (College Station, TX: Stata Press, 1997).

and structure; (7) poles; and (8) underground structure. These regression equations, other than the equations for poles and underground structure, are developed by revising the regression equations for cable and structure costs developed by Gabel and Kennedy in the NRRI Study.[2] The regression equations adopted in this Order, other than the equation for poles, are estimated by using the Huber methodology with RUS data. The regression equations in the NRRI Study[3] are developed by using ordinary least squares (OLS) with RUS data.[4] The regression equation for poles adopted in this Order is the regression equation for poles in the NRRI Study. The regression equation adopted in this Order for poles is not estimated by using the Huber methodology because the Huber regression for poles is not statistically significant at the five percent level.

5. Column A identifies, by type of cost, the regression equations adopted in this Order. Set forth in columns B, D, F, H, J, L, and N are the intercepts and the slope coefficients reflected in these regression equations. The coefficients set forth in these columns for these regression equations are for the variables that indicate the size of a cable,[5] density zone,[6] soil surface texture,[7] bedrock

[2] There is no regression equation for underground structure in the NRRI Study. The regression equation for underground structure adopted in this Order was developed after the NRRI Study was published.

[3] These regression equations are set forth in the NRRI Study at 58, Table 2-16 (24-gauge aerial copper cable cost); 60, Table 2-19 (24-gauge underground copper cable cost); 41, Table 2-7 (24-gauge buried copper cable and structure cost); 59, Table 2-18 (aerial fiber cable cost); 61, Table 2-20 (underground fiber cable cost); 49, Table 2-10 (buried fiber cable and structure cost); 52, Table 2-12 (pole cost).

[4] None of the regression equations adopted in this Order has a variable that indicates the presence of a second cable at the same location. The regression equations in the NRRI Study, other than the equation for poles, have a variable that indicates the presence of a second cable at the same location. The regression equations adopted in this Order for poles, underground structure, buried copper cable and structure, and buried fiber cable and structure have a variable that indicates the presence of a high water table. The regression equation in the NRRI Study for poles and buried fiber cable and structure have a variable that indicates the presence of a high water table. The regression equation in the NRRI Study for buried copper cable and structure does not have this variable.

[5] The cable size variable is used in the regression equations for estimating the cost of 24-gauge aerial copper cable, 24-gauge underground copper cable, 24-gauge buried copper cable and structure, aerial fiber cable, underground fiber cable, and buried fiber cable and structure. It has values that equal the number of copper cable pairs in the 24-gauge copper cable regression equations and the number of fiber cable strands in the fiber cable regression equations.

[6] The density zone variable is used in the regression equations for 24-gauge buried copper cable and structure cost and buried fiber cable and structure cost. It has a value of 1 if a buried cable is installed in density zone 2; 0 if a buried cable is installed in density zone 1.

[7] The variable that indicates soil surface texture is used in the regression equation for pole cost. It has values that range from 0 for normal soil, to 1 for soft soil, to 3 for hard soil. *See* NRRI Study at 16 and 46, Table 2-8.

type,[8] combined
bedrock and soil type,[9] and the presence of a high water table.[10] Columns C, E, G, I, K, M, and O display the t-statistics used to measure the statistical significance of these intercepts and coefficients. Column P displays the F-statistics used to measure the statistical significance of these regression equations. Column O displays the number of observations in the data used to estimate these equations.

6. The coefficients for the variable that indicates the size of the cable in the regression equations for 24-gauge copper cable cost and fiber cable cost do not reflect the adjustments adopted in this Order for large LEC buying power. The intercepts and the coefficients in these equations do not reflect splicing and LEC engineering costs because these costs are not reflected in the RUS data from which these equations are derived. The intercepts and the coefficients for the water, soil, and bedrock indicator variables in the regression equations for structure costs do not reflect LEC engineering costs because these costs are not reflected in the RUS data from which these equations are derived. The intercept and the coefficients for the water, soil, and bedrock indicator variables in the regression equation for pole costs do not reflect costs for anchors, guys, and other pole-related items because these costs are not reflected in the RUS data from which this equation is derived.

B. Adjustments To Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs

7. Table II, labeled "Adjustments To Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs," sets forth adjustments to the regression equations adopted in this Order for estimating costs for 24-gauge copper cable, fiber cable, and structure. The equations that reflect these adjustments, *i.e.*, the adjusted equations, are used for estimating the cost of: (1) 24-gauge aerial copper cable; (2) 24-gauge underground copper cable; (3) 24-gauge buried copper cable; (4) aerial fiber cable; (5) underground fiber cable; (6) buried fiber cable; (7) aerial structure; (8) underground structure; and (9) buried structure.

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[8] The variable that indicates bedrock type is used in the regression equation for pole cost. It has values that range from 0 for normal rock, to 1 for soft rock, to 2 for hard rock. These bedrock types are at a depth of 48 inches. *See* NRRI Study at 16 and 44, Table 2-8.

[9] The combined bedrock and soil type variable is used in the regression equations for 24-gauge buried copper cable and structure cost, buried fiber cable and structure cost, and underground structure cost. It is the sum of separate variables for surface soil texture and bedrock type at a depth of 36 inches. *See* NRRI Study at 45, Table 2-8. The value of the variable that indicates surface soil texture ranges from 0 for normal soil, to 1 for soft soil, to 3 for hard soil. *See* NRRI Study at 16 and 46, Table 2-8. The value of the variable that indicates bedrock type ranges from 0 for normal rock, to 1 for soft rock, to 2 for hard rock at a depth of 36 inches. *See* NRRI Study at 16 and 44, Table 2-8. Accordingly, the value of the variable for the combined bedrock and soil type indicator ranges from 0 where there are normal surface soil texture and normal bedrock at a depth of 36 inches to 5 where there are hard surface soil texture and hard bedrock at a depth of 36 inches.

[10] The variable that indicates the presence of a high water table is used in the regression equations for 24-gauge buried copper cable and structure cost, buried fiber cable and structure cost, pole cost, and underground structure cost. It has values that range from 0 for the absence of a high water table, to 1 for the presence of a high water table. This variable assumes that a high water table has a depth of five feet or fewer. *See* NRRI Study at 12, 16 and 46, Table 2-8.

8. Column A identifies, by type of cost, the adjusted equations used to derive the cable and structure costs adopted as input values in this Order.

9. Column B displays the intercepts in the adjusted equations. In the adjusted equations for the cost of aerial and underground 24-gauge copper cable, fiber cable, and structure, the intercepts are those in the regression equations for these costs. The intercepts in the adjusted equations for 24-gauge buried copper cable and buried fiber cable represent the fixed cost of buried copper cable and the fixed cost of buried fiber cable, respectively. The intercepts in the regression equations for 24-gauge buried copper cable and structure and buried fiber cable and structure represent the fixed cost of buried copper cable and structure and the fixed cost of buried fiber cable and structure, respectively, in density zone 1. The fixed cost of 24-gauge buried copper cable used as the intercept in the adjusted equation for 24-gauge buried copper cable, approximately \$.46 per foot, is derived by subtracting from the intercept in the regression equation for 24-gauge buried copper cable and structure, approximately \$1.16 per foot, the value of the fixed cost for buried structure in density zone 1 adopted in this Order, \$.70 per foot. The fixed cost of fiber cable used as the intercept in the adjusted equation for fiber cable, approximately \$.47 per foot, is derived by subtracting from the intercept in the regression equation for buried fiber cable and structure, approximately \$1.17 per foot, the \$.70 per foot fixed cost adopted for buried structure in density zone 1. The intercept in the adjusted equation for buried structure represents the fixed cost of buried structure in density zone 1. The fixed cost of buried structure in density zone 1 used as the intercept in the adjusted equation for buried structure is the \$.70 per foot fixed cost adopted for buried structure in density zone 1.

10. Column C displays the coefficients for the cable size variable in the adjusted 24-gauge copper and fiber cable equations. In the adjusted equations for the cost of aerial and underground 24-gauge copper cable and fiber cable, the coefficients for the cable size variable are those for this variable in the regression equations for these costs. In the adjusted 24-gauge copper cable equation, the coefficient for the cable size variable is the coefficient for this variable in the 24-gauge buried cable and structure regression equation. In the adjusted 24-gauge fiber cable equation, the coefficient for the cable size variable is the coefficient for this variable in the buried fiber cable and structure regression equation.

11. Column D displays the large LEC buying power adjustment factors. These factors are applied to the coefficients for the cable size variable in the adjusted copper and fiber cable equations. Column E displays the values of the coefficients for these cable size variables in these equations, as adjusted to reflect large LEC buying power.

12. Columns F, G, and H display the coefficients for the density zone, bedrock indicator, and combined soil and bedrock indicator variables in the adjusted structure equations. In the adjusted equations for the cost of aerial and underground structure, these coefficients are those for these variables in the regression equations for these costs. In the adjusted buried structure equation, these coefficients are those for these variables in the 24-gauge buried copper cable and structure regression equation. The coefficients for the water and soil indicator variables in the structure regression equations are not reflected in the adjusted equations because the value for these variables is set equal to zero to estimate structure costs used as input values.

13. Column I displays the loading factors used to reflect splicing costs in the cable cost estimates for 24-gauge copper cable and fiber cable.

14. Column J displays the loading factor used to reflect LEC engineering costs in the structure cost estimates.

15. Column K displays the flat dollar loading used to reflect LEC engineering costs in the cable cost estimates for 24-gauge copper cable and fiber cable.

16. Column L displays the adjusted equations used to estimate costs for aerial, underground, and buried 24-gauge copper and fiber cable, buried and underground structure, and poles.

17. Columns M-O display adjustments to the adjusted pole equation. These adjustments add to the cost of poles the costs for anchors, guys, and other pole-related items, including LEC engineering costs associated with these additional items, and convert per pole costs, inclusive of costs for anchors, guys, and other pole-related items, *i.e.*, aerial structure costs, to per foot costs. Column M displays the costs for anchors, guys, and other pole-related items for density zones 1 and 2 ($32.98 per pole), density zones 3-7 ($49.96 per pole), and density zones 8 and 9 ($60.47 per pole).[11] Column N displays the loading factor used to reflect LEC engineering costs in the costs for anchors, guys, and other pole-related items. Column O displays the distance between poles used to calculate aerial structure cost per foot for density zones 1 and 2 (250 feet per pole), density zones 3 and 4 (200 feet per pole), density zones 5 and 6 (175 feet per pole), and density zones 7-9 (150 feet per pole).

18. Column P displays the adjusted equation used to estimate aerial structure cost per foot, including poles, anchors, guys, and other pole-related items.

19. We illustrate how the adjusted equations are used to develop the input values adopted in this Order by calculating the cost for a 100-pair 24-gauge aerial copper cable. Column L sets forth the adjusted equation used to develop the input values adopted in this Order for 24-gauge aerial copper cable. The adjusted equation set forth in column L for 24-gauge aerial copper cable is as follows:[12]

$$A1 = (B1 + (E1)(\#\text{ of Prs.}))(1 + I1) + K1$$

where:

A1 = 24-gauge aerial copper cable cost per foot;
B1 = the intercept for 24-gauge aerial copper cable in dollars per foot;
E1 = the coefficient, adjusted for buying power, in dollars per pair per foot, for the variable that represents the number of 24-gauge aerial copper cable pairs;

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[11] These costs for anchors, guys, and other pole-related items are based on the costs for these items in rural, suburban, and urban areas derived by Gabel and Kennedy in the NRRI Study. *See* NRRI Study at 51, Table 2-11.

[12] Set forth on Table II in specific columns and on specific rows are the values for the intercepts, coefficients (including the adjusted coefficients for the cable size variable), splicing loadings, and LEC engineering loadings reflected in the adjusted equations used to estimate structure and cable costs. The specific column is identified by a letter. The specific row is identified by a number. B1, for example, refers to the value set forth in column B on row 1.

I1 = the splicing loading for 24-gauge aerial copper cable expressed as a percentage;
K1 = the LEC engineering loading for 24-gauge aerial copper cable in dollars per foot.

20. By substituting into the above equation for 24-gauge aerial copper cable the values from Table II for the intercept, adjusted coefficient for the cable size variable, splicing loading, and LEC engineering loading, and the number of cable pairs in this example, 100, we obtain the following estimate for the cost of a 100-pair 24-gauge aerial copper cable:

$$
\begin{aligned}
A1 &= (1.014907 + (.008329)(100))(1 + .094) + .19 \\
&= (1.014907 + .8329)(1.094) + .19 \\
&= (1.847807)(1.094) + .19 \\
&= 2.021501 + .19 \\
&= \$2.21 \text{ per foot.}
\end{aligned}
$$

We adopt this estimate as the input in the model for the cost of a 100-pair 24-gauge aerial copper cable.

C. Regression Equations Derived From Non-Rural LEC Data For Estimating Cable Costs

21. We adopt in this Order a methodology to derive estimates of 26-gauge copper cable costs from 24-gauge copper cable costs. We first estimate by using the Huber methodology with RUS data the cost for 24-gauge copper cable for each cable size.[13] We then obtain by using the Huber methodology with certain non-rural LEC data estimates of the cost for 24-gauge copper cable and 26-gauge copper cable for each cable size.[14] We next divide the 24-gauge copper cable cost estimate derived from the non-rural LEC data into the estimate for 26-gauge copper cable cost derived from these data for each cable size. The result is a ratio of 26-gauge copper cable cost to 24-gauge copper cable cost for each cable size.[15] Finally, we multiply this ratio by the estimate of the cost for 24-gauge copper cable derived from the RUS data to obtain the cost for 26-gauge copper cable for each cable size.[16] We adopt these estimates as inputs for 26-gauge copper cable costs in the SM.

22. Table III, labeled "Regression Equations Derived From Non-Rural LEC Data For Estimating Cable Costs," sets forth regression equations derived from the non-rural LEC data for: (1)

[13] More technically, we obtain from these RUS data an estimate of the expected value of the cost for 24-gauge copper cable for each cable size.

[14] More technically, we obtain from these non-rural LEC data estimates of the expected value of the cost for 24-gauge copper cable and 26-gauge copper cable for each cable size.

[15] More technically, we obtain from these non-rural LEC data a ratio of an estimate of the expected value for 26-gauge copper cable cost to an estimate of the expected value for 24-gauge cable cost for each cable size.

[16] More technically, we obtain an estimate of the expected value for 26-gauge copper cable cost.

24-gauge aerial copper cable; (2) 24-gauge underground copper cable; (3) 24-gauge buried copper cable; (4) 26-gauge aerial copper cable; (5) 26-gauge underground copper cable; and (6) 26-gauge buried copper cable. We use these regression equations to develop the ratios of 26-gauge copper cable costs to 24-gauge copper cable costs used to derive the cost for 26-gauge copper cable. Column A identifies these regression equations by type of copper cable cost. Set forth in columns B and D are the intercepts and the slope coefficients reflected in these regression equations. Columns C and E display the t-statistics used to measure the statistical significance of these intercepts and coefficients. Column F displays the F-statistics used to measure the statistical significance of these regression equations. Column G displays the number of observations in the data used to estimate these equations. Column H shows the regression equations derived from the non-rural LEC data for estimating costs for 24-gauge and 26-gauge copper cable.

23. These regression equations are derived from *ex parte* data on 24-gauge and 26-gauge copper cable costs submitted by Sprint and Aliant, data on these cable costs submitted by BellSouth with its comments,[17] and the BCPM default values for these cable costs. These regression equations are developed by using the Huber methodology. Using the Huber methodology with non-rural LEC data to estimate cable costs for 24- and 26-gauge copper cable costs is consistent with use of this methodology to estimate 24-gauge copper cable costs from the RUS data. The regression equations derived from non-rural LEC data use the number of copper cable pairs as the sole independent variable. Using the number of copper cable pairs as the sole independent variable in these regression equations is consistent with using this variable as the sole independent variable in the regression equations for 24-gauge copper cable costs estimated from the RUS data.

24. In this Order, we find it reasonable to rely on the non-rural LEC data for calculating the ratio of the cost for 24-gauge copper cable to that for 26-gauge copper cable but not for calculating the absolute cost for 24-gauge copper cable and 26-gauge copper cable.[18] As discussed in this Order, we find that the non-rural LEC data is not a reliable measure of absolute costs. Notwithstanding this finding, we conclude that it is reasonable to use the non-rural LEC data to determine the relative value of the cost for 24-gauge copper cable to that for 26-gauge copper cable. We find that it is reasonable to conclude that each LEC used the same methodology to develop both 24-gauge and 26-gauge copper cable costs. Accordingly, any bias in the costs for 24-gauge and 26-gauge copper cable that results from using a given methodology is likely to be in the same direction

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[17] *See* BellSouth *Inputs Further Notice* comments, Exhibit 1. BellSouth submitted separate copper cable costs for nine study areas. We calculate the weighted average of these copper cable costs for each cable size based on the number of access lines in each study area. We include this weighted average cable cost for BellSouth for each cable size in the non-rural LEC data from which we derive 24-gauge and 26-gauge copper cable costs. By using a weighted average, the regression equations derived from the non-rural LEC data do not reflect a disproportionate number of observations for BellSouth compared to the number of observations for the other non-rural LECs for which costs are reflected in these data. The cable costs reflected in the data for these other LECs are either company-wide costs or an average for multiple study areas. In either case, there is a single observation for each of these companies for a given cable size for 24-gauge and 26-gauge copper cable cost. By reflecting the weighted average cost for BellSouth in the data, there is only one observation for BellSouth for a given cable size for 24-gauge and 26-gauge copper cable cost.

[18] We discuss the rationale for using non-rural LEC data to calculate relative copper cable costs, but not absolute copper cable costs, in this Order, section V.C.4.b.

and of a similar magnitude. As a consequence, cost estimates for 24-gauge and 26-gauge copper cable for each cable size developed from non-rural LEC data by using the Huber methodology are likely to be biased by approximately the same factor. The ratios of these estimates are not likely to be affected significantly because the bias in one estimate approximately cancels the bias in the other estimate when the ratio is calculated.

25. We illustrate how we calculate the costs that we adopt in this Order for 26-gauge copper cable by calculating the cost for a 100-pair 26-gauge aerial copper cable. As explained above, we derive a ratio of 26-gauge copper cable cost to 24-gauge copper cable cost from non-rural LEC data to obtain costs for 26-gauge copper cable. To calculate this ratio for a 100-pair aerial copper cable, we estimate separately from non-rural LEC data the cost for a 100-pair 24-gauge aerial copper cable and a 100-pair 26-gauge aerial copper cable. We first estimate the numerator of this ratio, *i.e.*, the cost for a 100-pair 24-gauge aerial copper cable. Column H shows the regression equation derived from non-rural LEC data for estimating the cost for 24-gauge aerial copper cable. The regression equation set forth in column H for 24-gauge aerial copper cable is as follows:

$$A1 = B1 + (D1)(\# \text{ of Pairs})$$

where:

A1 = 24-gauge aerial copper cable cost per foot;
B1 = the intercept for 24-gauge aerial copper cable in dollars per foot;
D1 = the coefficient in dollars per pair per foot for the variable that represents the number of 24-gauge aerial copper cable pairs.

26. By substituting into the above equation for 24-gauge aerial copper cable the values from Table III for the intercept and the coefficient for the cable size variable, and the number of cable pairs in this example, 100, we obtain the following result for the cost of a 100-pair 24-gauge aerial copper cable:

$$A1 = 2.1548 + (.012393)(100)$$

$$= 2.1548 + 1.2393$$

$$= \$3.39 \text{ per foot.}$$

27. We next estimate the denominator for the ratio of 26-gauge aerial copper cable cost to 24-gauge aerial copper cable cost for a 100-pair aerial copper cable, *i.e.*, the 26-gauge aerial copper cable cost for a 100-pair cable. Column H shows the regression equation derived from non-rural LEC data for estimating the cost for 26-gauge aerial copper cable. The regression equation set forth in column H for 26-gauge aerial copper cable is as follows:

$$A4 = B4 + (D4)(\# \text{ of Pairs})$$

where:

A4 = 26-gauge aerial copper cable cost per foot;
B4 = the intercept for 26-gauge aerial copper cable in dollars per foot;
D4 = the coefficient in dollars per pair per foot for the variable that represents the number of

26-gauge aerial copper cable pairs.

28. By substituting into the above equation for 26-gauge aerial copper cable the values from Table III for the intercept and the coefficient for the cable size variable, and the number of cable pairs in this example, 100, we obtain the following result for the cost of a 100-pair 26-gauge aerial copper cable:

$$A4 = 2.385108 + (.008721)(100)$$

$$= 2.385108 + .8721$$

$$= \$3.26 \text{ per foot.}$$

29. We next calculate the ratio of 26-gauge copper cable cost to 24-gauge copper cable cost for a 100-pair cable. The ratio of 26-gauge copper cable cost to 24-gauge copper cable cost for a 100-pair cable is .96 ($3.26 per foot divided by $3.39 per foot).

30. Finally, we multiply this ratio by the estimate of the 24-gauge copper cable cost for a 100-pair cable derived from the RUS data, $2.21 per foot, to obtain the cost for a 100-pair 26-gauge copper cable, $2.12 per foot. We adopt this estimate as the input in the SM for the cost of a 100-pair 26-gauge aerial copper cable.

III. Huber Methodology

31. We find in this Order that it is reasonable to use the Huber methodology to develop input values for cable and structure costs. The structure and cable cost inputs used in the SM should reflect those that are typical for cable and structure for a number of different density and terrain conditions. Otherwise, the model may substantially overestimate or underestimate the cost of building a network. The Huber methodology produces estimates of costs that are typical for cable and structure by assigning zero or less than full weight to cable and structure cost observations that have extremely high or extremely low values. At the same time, it assigns full or nearly full weight to closely clustered cable and structure cost observations.

32. Use of the Huber methodology to derive reasonable estimates from RUS data is illustrated for aerial copper cable cost on the diagram labeled "Scatter Diagram Of 24-Gauge Aerial Copper Cable Cost And Size With The Huber Regression Line" and on the frequency distribution set forth on Table IV, labeled "Frequency Distribution Of Huber Weights For 24-Gauge Aerial Copper Cable Cost." The scatter diagram shows RUS cable cost data points representing combinations of aerial copper cable costs (measured on the vertical axis in dollars per foot) and cable size (measured on the horizontal axis by number of pairs). It also shows the regression line that the Huber methodology fits to these data points. The algebraic expression of this line explains or predicts the effects on aerial copper cable costs of changes in cable size.[19] The observations to which Huber

[19] The algebraic expression of the regression line for 24-gauge aerial copper cable estimated from RUS data by using the Huber methodology is as follows:

24-gauge aerial copper cable cost per foot = 1.014907 + (.009822)(number of pairs).

assigns a weight that is less than .47 are identified with an "o"; those to which it assigns a weight that is greater than .47 are identified with an "*". The frequency distribution shows the number of aerial copper cable observations to which the Huber methodology assigns particular weights.

33. The scatter diagram and the frequency distribution demonstrate that the aerial copper cable estimates derived by using the Huber methodology with RUS data reflect most of the information contained in nearly all of the observations. As depicted on the scatter diagram, the majority of the aerial copper cable observations are clustered closely around the regression line. These are the observations to which Huber assigns the greatest weight when fitting the regression line to the data. As the frequency distribution shows, approximately 82 percent of the aerial copper cable observations is assigned a weight of at least .8. This large majority of closely clustered observations clearly represents typical cable costs. The minority of the aerial copper cable observations lies a considerable distance from the regression line. These are the observations to which Huber assigns the least weight when fitting the regression line to the data. As the frequency distribution shows, approximately 18 percent of the observations is assigned a weight of at less than .8. This small minority of observations comprises extremely high and extremely low values that do not represent typical cable costs. The scatter diagram also shows that some of the observations that receive a relatively small weight lie a substantial distance above the regression line while others that receive such weight lie a substantial distance below this line. This demonstrates that the Huber methodology excludes or assigns less than full weight to data outliers without regard to whether these are high or low cost observations.

IV. Analysis Of Coefficient For Cable Size Variable In The Huber Regression Equations

34. In this Order, we derive equations to estimate the non-rural LECs' labor and material cost for cable. We derive these equations by: (1) deriving regression equations by using the Huber methodology with RUS cable cost data that reflect labor and material costs; and (2) adjusting downward the coefficient for the variable that represents cable size in these regression equations to reflect the buying power of large LECs in comparison to RUS companies. The coefficient for the variable that represents cable size represents the additional cost for an additional pair of cable and therefore represents cable material costs. The adjustment to this coefficient is based on the difference between the average cable material prices that Bell Atlantic and the RUS companies pay for different cable sizes. The RUS companies' average cable material prices are calculated by using unweighted RUS data. Conversely, the Huber methodology used to estimate the regression equations assigns zero or less than full weight to data points that have extremely high or extremely low values. Below we demonstrate that the Huber methodology generally does not have a statistically significant impact on the level of material costs reflected in the cable cost estimates. That is, in general, there is not a statistically significant difference between the value of the coefficient for the cable size variable in the regression equations estimated by using the Huber methodology and the value of this coefficient in the

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In this regression equation, 24-gauge aerial copper cable cost is the dependent variable for which a value is measured along the vertical axis. The number of pairs is the independent variable for which a value is measured along the horizontal axis. The value 1.014907 is the intercept of the regression line. It is the point at which the regression line hits the vertical axis. It measures the fixed cost for 24-gauge aerial copper cable. The value .009822 is the slope coefficient of the regression line. It is the slope of the regression line. It measures the additional cost for one additional pair of 24-gauge aerial copper cable.

regression equations developed in the NRRI Study by using OLS. Accordingly, the buying power adjustment for material is based on averages of RUS companies' cable material prices calculated by using unweighted RUS data.

35. Table V, labeled "Analysis Of Coefficient For Cable Size Variable In The Huber Regression Equations," displays the values of the coefficient for the cable size variable in the regression equations estimated from RUS data by using the Huber methodology in this Order and the 95 percent confidence interval surrounding the value of this coefficient in these equations in the NRRI Study estimated from these data by using OLS. Except for 24-gauge buried copper cable, the value of the this coefficient estimated by using the Huber methodology lies inside the 95 percent confidence interval surrounding the value of this coefficient in these equations in the NRRI Study estimated from these data by using OLS. That is, except for 24-gauge buried copper cable, the value of the cable size coefficient estimated by using the Huber methodology lies within an interval that contains with 95 percent certainty the true value of the OLS cable size coefficient.[20] This statistical evidence supports a finding that the Huber methodology does not have a statistically significant impact on the level of the material costs reflected in the cable cost estimates derived by using this methodology.[21] The cable size coefficient obtained by using the Huber methodology for buried copper cable lies outside the 95 percent confidence interval associated with the cable size coefficient obtained by using OLS for buried copper cable. This supports a finding that the Huber methodology does have a statistically significant impact on the level of the material costs reflected in the buried copper cable cost estimates.[22]

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[20] Strictly speaking, over a large number of different samples, 95 percent of the confidence intervals associated with different OLS estimates of the cable size coefficient are expected to contain the true value of the OLS cable size coefficient.

[21] In this Order, we affirm the tentative decision in the *Inputs Further Notice* to use conservatively the lower of the buying power adjustments for aerial and underground copper cable material costs as the adjustment for buried copper cable material costs because the Huber methodology does have a statistically significant impact on the buried copper cable material costs reflected in the buried copper cable cost estimates. *See* this Order, section V.C.4.b.

[22] The specifications for the copper and fiber cable regression equations in the NRRI Study differ slightly from the copper and fiber cable regression equations adopted in this Order. The difference in the specifications does not alter the statistical conclusions regarding the impact of the Huber methodology on the level of cable material costs reflected in the cable cost estimates. We estimated by using OLS copper and fiber cable regression equations for which the specifications matched identically those for the copper and fiber cable regression equations estimated by using the Huber methodology. Again, with one exception, the cable size coefficient in the regression equations estimated by using the Huber methodology lies inside the 95 percent confidence interval associated with the cable size coefficient in the regression equations with the identical specifications estimated by using OLS. The one exception is that the value of the cable size coefficient in the buried copper cable and structure regression equation estimated by using the Huber methodology lies outside the 95 percent confidence interval associated with the cable size coefficient in the buried copper cable and structure regression equation with the identical specification estimated by using OLS. Again, we conclude that the Huber methodology does not have a statistically significant impact on the level of the cable material costs reflected in the cable cost estimates other than the buried cable cost estimates.

I. Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
	Cost	Intercept		# of Pairs or Strands		Density Zone		Soil Indicator		Bedrock Indicator		Soil & Bedrock Ind.		Water Indicator		F-stat.	# of Obs.
	($/ft. or $/pole)	Coeff. ($/ft.)	t-stat.	Coeff. ($/pr./ft. or $/sd./ft.)	t-stat.	Coeff. ($/ft.)	t-stat.	Coeff. ($/ft.)	t-stat.	Coeff. ($/ft.)	t-stat.	Coeff. ($/ft.)	t-stat.	Coeff. ($/ft.)	t-stat.		
1	24-Ga. Ae. Copper Cable	1.014907	19.097	0.009822	58.826											3,460.48	255
2	24-Ga. Ug. Copper Cable	3.263600	9.854	0.009176	24.661											608.18	81
3	24-Ga. Bu. Cop. Cab. and Struct.	1.159783	3.892	0.010601	80.867	0.699215	2.353					0.575117	2.496	0.274372	2.866	1,658.33	1,131
4	Ae. Fiber Cable	0.980309	25.998	0.034856	37.179											1,382.27	168
5	Ug. Fiber Cable	2.096959	19.683	0.030226	17.232											296.94	128
6	Bu. Fiber Cable and Structure	1.166925	4.581	0.037942	25.488	0.813426	3.178					0.281657	1.222	0.119164	1.032	172.80	707
7	Poles	310.645	9.233					49.99036	0.204	66.07799	2.101			112.5506	2.233	3.51	19
8	Ug. Structure	1.690036	16.822									3.560339	1.835	-0.795052	-5.072	18.76	235

II. Adjustments To Regression Equations Derived From RUS Data For Estimating Cable And Structure Costs

	A	B	C	D	E	F	G	H	I	J	K	L
	Cost ($/ft. or $/pole)	Intercept ($/ft.) (tab. I, col. B)	# of Prs. or Sds. Coeff. ($/pr./ft. or $/sd./ft.) (tab. I, col. D)	Buy Power Adjustment (%)	# of Prs. or Sds. Adj. Coeff. ($/pr./ft. or $/sd./ft.) ((C)(D))	Dens. Zone Coeff. ($/ft.) (tab. I, col. F)	Rock Ind. Coeff. ($/ft.) (tab. I, col. J)	Soil & Rock Ind. Coeff. ($/ft.) (tab. I, col. L)	Splicing Loading (%)	LEC Eng. Loading (%)	LEC Eng. Loading ($/ft.)	Adjusted Equation
1	24-Ga. Ae. Copper Cable	1.014907	0.009822	0.152	0.008329				0.094		0.19	A1 = (B1 + (E1)(# of Prs.))(1 + I1) + K1
2	24-Ga. Ug. Copper Cable	3.263600	0.009176	0.163	0.007680				0.094		1.50	A2 = (B2 + (E2)(# of Prs.))(1 + I2) + K2
3	24-Ga. Bu. Copper Cable	0.459783	0.010601	0.152	0.008990				0.094		0.16	A3 = (B3 + (E3)(# of Prs.))(1 + I3) + K3
4	Ae. Fiber Cable	0.980309*	0.034856	0.338	0.023075				0.047		0.19	A4 = (B4 + (E4)(# of Sds.))(1 + I4) + K4
5	Ug. Fiber Cable	2.096959	0.030226	0.278	0.021823				0.047		0.65	A5 = (B5 + (E5)(# of Sds.))(1 + I5) + K5
6	Bu. Fiber Cable	0.466925**	0.037942	0.278	0.027394				0.047		0.14	A6 = (B6 + (E6)(# of Sds.))(1 + I6) + K6
7	Ae. Structure	310.645					66.07799			0.10		A7 = (B7 + (G7)(Rock Ind.))(1 + J7)****
8	Ug. Structure	1.690036						3.560339		0.10		A8 = (B8 + (H8)(Soil & Rock Ind.))(1 + J8)
9	Bu. Structure	0.70***				0.699215		0.575117		0.10		A9 = (B9 + (F9)(Dens. Zone) + (H9)(Soil & Rock Ind.))(1 + J9)
10												

Row 7, Columns M-P, Aerial Structure Cost

	M	N	O	P
	Anchors, Guys & Other Costs ($/pole)	LEC Eng. Loading (%)	Pole Spacing (ft./pole)	Adjusted Equation For Aerial Structure Cost
7	32.98 or 49.96 or 60.47	0.10	250 or 200 or 175 or 150	A7 = (L7 + (M7)(1+ N7))/O7*****

* This intercept reflects the intercept in the buried copper cable and structure regression equation set forth on table I, column B, row 3, 1.159783, minus the estimated fixed cost for buried cable structure in density zone 1 adopted in this Order, .70.

** This intercept reflects the intercept in the buried fiber cable and structure regression equation set forth on table I, column B, row 6, 1.166925, minus the estimated fixed cost for buried cable structure in density zone 1 adopted in this Order, .70.

*** This intercept reflects the fixed cost for buried structure in density zone 1 adopted in this Order, .70.

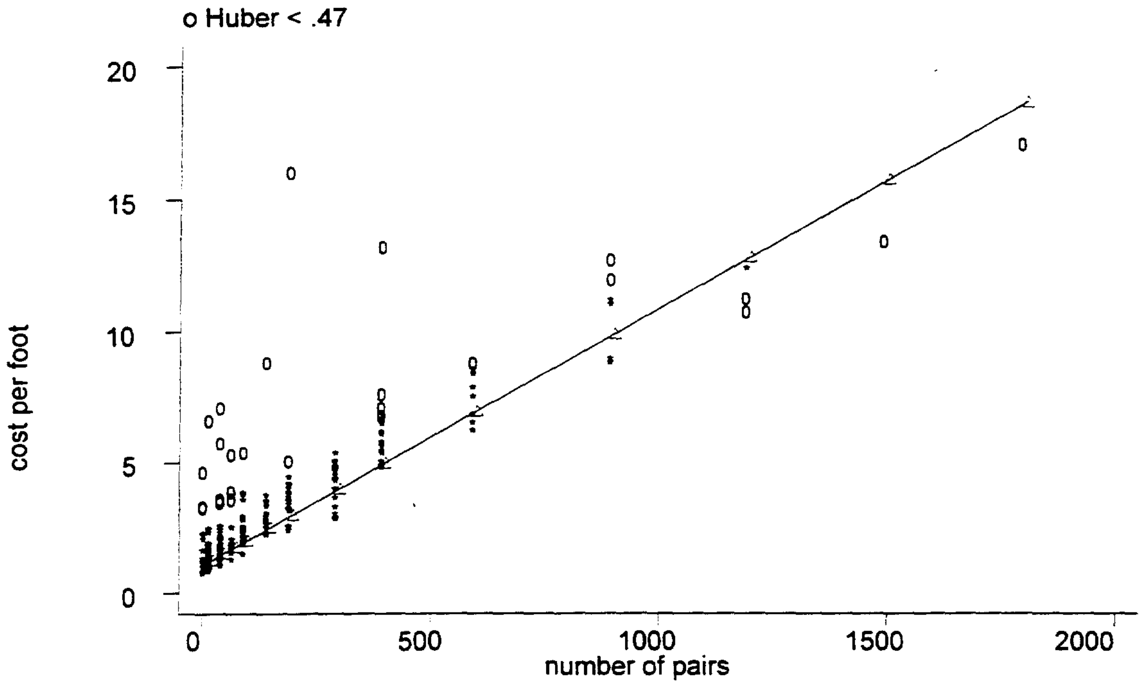
**** This equation provides the per pole cost for telephone poles.

***** This equation provides the per foot cost for aerial structure including costs for poles, anchors, guys, and other pole-related items.

. III. Regression Equations Derived From Non-Rural LEC Data For Estimating Cable Costs

	A	B	C	D	E	F	G	H
	Cost ($/ft.)	Intercept Coeff. ($/ft.)	Intercept t-stat.	# of Pairs Coeff. ($/pr./ft.)	# of Pairs t-stat.	F-stat.	# of Obs.	Equation
1	24-Ga. Ae. Copper Cable	2.1548	10.671	0.012393	87.192	7,602.52	60	A1 = B1 + (D1)(# of Pairs)
2	24-Ga. Ug. Copper Cable	1.634736	5.368	0.011827	59.101	3,492.98	58	A2 = B2 + (D2)(# of Pairs)
3	24-Ga. Bu. Copper Cable	1.175022	4.887	0.013348	78.076	6,095.83	59	A3 = B3 + (D3)(# of Pairs)
4	26-Ga. Ae. Copper Cable	2.385108	13.807	0.008721	69.820	4,874.84	58	A4 = B4 + (D4)(# of Pairs)
5	26-Ga. Ug. Copper Cable	1.663778	6.776	0.008706	53.956	2,911.28	58	A5 = B5 + (D5)(# of Pairs)
6	26-Ga. Bu. Copper Cable	1.204554	9.484	0.010041	111.178	12,360.49	59	A6 = B6 + (D6)(# of Pairs)

Scatter Diagram Of 24-Gauge Aerial Copper Cable Cost And Size With The Huber Regression Line



IV. Frequency Distribution Of Huber Weights For 24-Gauge Aerial Copper Cable Cost

Huber Weight (%)	# of Observations	Percentage of Observations	Cumulative Percentage of Observations
0.05	10	3.92	3.92
0.20	3	1.18	5.10
0.35	7	2.75	7.84
0.50	7	2.75	10.59
0.65	9	3.53	14.12
0.80	11	4.31	18.43
0.95	72	28.24	46.67
1.00	136	53.33	100.00
Total	255	100.00	

V. Analysis Of Coefficient For Cable Size Variable In The Huber Regression Equations

Regression Equation	Coefficient For Cable Size ($/pr./ft. or $/sd./ft.)	95 Percent Confidence Interval From NRRI Study ($/pr./ft. or $/sd./ft.)	NRRI Study Cite (page)
24-Ga. Aerial Copper Cable	0.009822	.008745 to .010106	58
24-Ga. Underground Copper Cable	0.009176	.008867 to .011413	60
24-Ga. Buried Copper Cable and Structure	0.010601	.011407 to .012379	41
Aerial Fiber Cable	0.034856	.031862 to .042126	59
Underground Fiber Cable	0.030226	.030122 to .039342	61
Buried Fiber Cable and Structure	0.037942	.032832 to .040332	49

APPENDIX C

DESCRIPTION OF METHODOLOGY FOR ESTIMATING SWITCHING COSTS

1. Switch Cost Data. The depreciation rate reports filed by LECs contain information on Bell Operating Companies' (BOCs') digital switches that were reported as installed between 1983 and 1995 in the states specified, with certain exceptions. A small number of switches associated with apparent inconsistencies in the studies were not included in the set. In particular, for several locations in California, switches that were at the same location, but had different capacities, types, and year of installation, were reported as having the same per-line costs. These anomalies were judged to be the results of averaging by the respondent, and the switches in these locations were excluded from the data set. The following switches are also excluded from the data set: (1) switches for which there were no lines of capacity, such as those functioning solely as tandem switches; and (2) switches with fewer than 1,000 lines of capacity.

2. The sample was restricted to the period following the divestiture of AT&T, and to those switch types that could clearly be identified as either host or remote switches. These included the DMS-100, DMS-100 remote, DMS-10, 5ESS, 5ESS remote, and EWSD switch types. In total these restrictions removed about 500 observations from a data set of nearly 3,600 observations. Thus, after exclusions, the data set compiled by the Commission in conjunction with Gabel and Kennedy and the Bureau of Economic Analysis (BEA) of the Department of Commerce consisted of approximately 3,100 switches. In order to estimate the costs associated with the purchase and installation of new switches, and exclude the costs associated with upgrading switches, we removed those switches installed more than three years prior to the reporting of their associated book-value costs. The three-year restriction resulted in the removal of nearly 70% of observations, which do measure the cost of new switches. The depreciation data included in the data set selected by the Commission includes the remaining 946 observations.

3. The reports made to RUS by rural telephone companies contain information on the 181 digital switches installed in 1995 and 1996. To increase the reliability of analysis using these data, we removed the following observations from the data set: (1) observations containing information on switching equipment classified as upgrades to existing equipment and (2) observations containing information on switches reported as having no attached lines. These exclusions result in the removal of 42 observations. The RUS data included in the data set we select includes the remaining 139 observations.

4. Combined, the data set we employ includes 1,085 observations, 946 from the depreciation information and 139 from the RUS information. The RUS information includes a variable identifying switches as either hosts or remotes. The depreciation information does not. Therefore, an additional variable uniquely identifying switches as host switches or remote switches was added to the data set. Where data classifications were deemed unreasonable, switch types were reclassified. For example, switches identified as DMS-100

and 5ESS switches which terminated less than 2,000 customers and cost in the neighborhood of $500,000 were reclassified as remote switches. These classifications identified approximately 55% of the switches included in the combined data set as remotes.

5. <u>Regression Formulation</u>. The regression employed is of the form:

$$\text{Cost} = a_1 + a_2{*}\text{Lines} + a_3{*}\text{Host} + a_4{*}(1/\text{Time}) + a_5{*}\text{Lines}{*}(1/\text{Time}) + a_6{*}\text{Host}{*}(1/\text{Time}) + e$$

where time takes on the value of 1 in 1985, 2 in 1986...15 in 1999. Regression results, including estimated coefficient values (in 1997 dollars), are:

$$\underset{(105.100)}{\text{Cost} = 11.110} + \underset{(41.52)}{10.32{*}\text{Lines}} - \underset{(635,700)}{402.400{*}\text{Host}} + \underset{(970.500)}{2.205.000{*}(1/\text{Time})} + \underset{(352.6)}{1.121{*}\text{Lines}{*}(1/\text{Time})} + \underset{(4,757.000)}{1.080.000{*}\text{Host}{*}(1/\text{Time})}$$

Robust (heteroscedasticity adjusted) standard errors in parenthesis. Regression R-squared = 0.73.

Estimates, identified using the regression equation, for the fixed cost of host and remote switches and for the per-line cost of all switches (in 1997 dollars) are, respectively:

$$\text{Host Fixed Cost} = a_1 + a_3 + a_4{*}(1/\text{Time}) + a_6{*}(1/\text{Time})$$
$$\text{Remote Fixed Cost} = a_1 + a_4{*}(1/\text{Time})$$
$$\text{Per-line Cost} = a_2 + a_5{*}(1/\text{Time})$$

In estimating switch costs for 1999, the regression results (with time defined as 15) were converted into 1999 values using actual inflation between 1997 and 1998 and projected inflation between 1998 and 1999. Estimates for 1999, in 1999 dollars, identified using the regression equation, for the fixed cost of host and remote switches and for the per-line cost of all switches are, respectively:

$$\text{Host Fixed cost} = (1+\text{inflation}_{1998}){*}(1+\text{inflation}_{1999}){*}(a_1 + a_3 + a_4{*}(1/15) + a_6{*}(1/15))$$
$$\text{Remote Fixed Cost} = (1+\text{inflation}_{1998}){*}(1+\text{inflation}_{1999}){*}(a_1 + a_4{*}(1/15))$$
$$\text{Per-line Cost} = (1+\text{inflation}_{1998}){*}(1+\text{inflation}_{1999}){*}(a_2 + a_5{*}(1/15))$$

The inflation rate for 1998 is measured by the gross-domestic-product chain-type price index as published monthly by the Bureau of Economic Analysis of the U.S. Department of Commerce in the <u>Survey of Current Business</u>. The projected inflation rate for 1999 is reported in <u>The Economic and Budget Outlook: An Update</u>, published by the Congressional Budget Office on July 1, 1999. Inserting these inflation rates, the fixed cost of a host switch, the fixed cost of a remote switch, and the per-line cost for host or remote switches (in 1999 dollars) are, respectively:

$$\text{Host Fixed cost} = (1.01){*}(1.013){*}(a_1 + a_3 + a_4{*}(1/15) + a_6{*}(1/15))$$
$$\text{Remote Fixed Cost} = (1.01){*}(1.013){*}(a_1 + a_4{*}(1/15))$$
$$\text{Per-line Cost} = (1.01){*}(1.013){*}(a_2 + a_5{*}(1/15))$$

Inserting the coefficients from the regression analysis, the fixed cost of a host switch, the fixed cost of a remote switch, and the per-line cost for host or remote switches (in 1999 dollars) are, respectively:

$$\text{Host Fixed cost} = (1.01){*}(1.013){*}(11,110 - 402.400 + 2.205,000{*}(1/15) + 1,080,000{*}(1/15)) = 486,700$$

Remote Fixed Cost = (1.01)*(1.013)*(11,110 + 2,205,000*(1/15)) = 161,800
Per-line Cost = (1.01)*(1.013)*(10.32 + 1,121*(1/15)) = 87

6. In response to the *Inputs Further Notice*, Sprint contends the following:[1]

Sprint conducted regression analysis on the two data sets (depreciation and RUS) individually and arrived at the following conclusions:

1. No RUS variables are significant (5% level of significance).
2. Only the 'lines*1/time' variable in the depreciation data set is significant (5% level of significance).
3. Severe multicollinearity was found in the proposed regression equation (VIF>55).

Based upon this evidence Sprint suggests that the data in the Commission's proposed data set or the proposed regression equation appears to be "severely tainted" and recommends "dismissing all conclusions suggested as a result of this tainted data set and mis-specified regression model."

7. We reject Sprint's argument. While we acknowledge that there is collinearity amongst the explanatory variables, we note that this is typically the case in multiple regression models. Anderson, Sweeney, and Williams note that "...most independent variables in a multiple regression problem are correlated to some degree with one another."[2] Similarly Fomby, Hill, and Johnson note, "[f]requently in nonexperimental situations, some explanatory variables exhibit little variation, or the variation they do exhibit is systematically related to variation in other explanatory variables."[3]

Mulitiollinearity does not as Sprint implies indicate that the regression model is mis-specified.[4] Therefore, the issues of mis-specification and mutlticollinearity are independent, and Sprint provides no evidence that the regression model is mis-specified.

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[1] *Sprint Input Further Notice Comments* Attachment 6.

[2] *See* David Anderson, Dennis Sweeney, and Thomas Williams (1996), *Statistics for Business and Economics*, Sixth Edition at page 597.

[3] *See* Thomas Fomby, R. Carter Hill, and Stanley Johnson (1988), *Advanced Econometric Methods* at page 283.

[4] *See* William Green (1990), *Econometric Analysis* at 278 (noting that "the case of near collinearity or high intercorrelation among the variables is ... a statistical problem. The difficulty in estimation is not one of identification but of precision."), or Fomby, Hill, and Johnson at 284 (noting that "the primary statistical consequence of multicollinearity is that one or more of the estimated coefficients of the linear model may have large standard errors.")

8. Even with multicollinearity the least squares estimate is the minimum variance linear unbiased estimator, its standard error is correct, and the conventional confidence interval and hypothesis tests are valid.[5] The least squares estimates and hence forecasts based upon them are also best linear unbiased estimates and maximum likelihood estimates and hence are unbiased, efficient, and consistent.[6] Furthermore Ramanthan notes that "Multicollinearity may not affect the forecasting performance of a model and may possibly even improve it."[7]

9. Sprint also raises concerns in their comments regarding the lack of statistical significance of individual parameters in our estimates.[8] However as Golberger notes, while muliticollinearity may make the estimates of individual parameters less precise, it may "facilitate the precise estimation of particular combinations of elements."[9] For example Sprint expresses concern that the lines variable "by itself" should be more significant. Staff analysis indicates, however, that jointly the variables Lines and Lines/Time are statistically significant, indicating that switches increase significantly in cost when additional lines are purchased at installation.. Therefore, one would be in error to conclude that, based upon individual "t-statistics," switch costs do not vary with line size.

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[5] *See* Arthur Goldberger (1991), *A Course in Econometrics* at 246.

[6] *See* Ramu Ramanthan (1989), *Introductory Econometrics* at 232.

[7] *See* Ramu Ramanthan (1989), *Introductory Econometrics* at 233.

[8] *See Sprint Inputs Further Notice Comments* at 44.

[9] *See* Arthur Goldberger (1991), *A Course in Econometrics* at 250.

APPENDIX D

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APPENDIX D

DESCRIPTION OF METHODOLOGY FOR ESTIMATING EXPENSES

1. Data Sources used in Regression Analysis. The use of multiple variables in the estimation process required that various data sources be used to determine the common support service expense model inputs. Because the reporting requirements and number of company study areas were different among the reports used, it was necessary to reconcile the data for 1998 expenses, access lines, and dial equipment minutes, as described below.

1998 Expenses
Data Source: ARMIS, 43-03 Report, "Total Regulated" Column.

Study Areas (SAs) reconciled:

Total SAs from ARMIS 43-03 Report:	125
Less:	
SAs combined to agree with access line data in ARMIS 43-08:	(8)

Study Area(s)	Combined with
MSID	PNID
COCA	GTCA
COTX	GTTX
PRCC	PRSA
COIL	GTIL
COIN	GTIN
COMO	GTMO
CONC	GTNC

SAs removed (not in NECA Tier I reporting): (1)
GTGO

SAs removed (certified rural): (36)
(GTAR, COAZ, GNCA, ALGC, COIA, COSI, GTIA, GTID, GLIL, GLIN, UTIN, COKY, GLMI, COCM, COEM, UTMO, ALNC, GTNE, UTNJ, CONM, GTNM, CONV, CTRH, CTUP, CTWC, ALWR, UTNW, ALPA, COPA, COQS, UTPA, COSC, UTTX, COVA, GTVA, COWA)

SAs used in analysis: **80**

Access Lines

Data Source: ARMIS, 43-08 Report, Table III,
Column (dj) "Total Switched Access Lines", and
Column (dm) "Total Access Lines (Switched and Special)"

Study Areas (SAs) reconciled:

Total SAs from ARMIS 43-08 Report::	116
Less:	
SAs combined to agree with ARMIS expense data and NECA usage data:	(7)

Study Area(s)	Combined with
NYNY (Conn)	NYNY (New York)
CBTC (IN & KY)	CBTC (Ohio)
LTNE (IA & KS)	LTNE (Nebraska)
UTIM (VA)	UTIM (Tenn)
PRCC	PRPR

SAs removed (not in NECA Tier I reporting): (2)
(COTM, CWTC)

SAs removed (certified rural) (27)
[GTSW(Ar & Nm), GTGC(Az & Nv), GTNW (Ca & Id), ALGC, GTMD(Ia & Ne), GTSO(Il & Va), COSO (Mi & In), UTIN, UTMO(Ia, Ks & Mo), ALNC, UTNJ, COWW, CTNY, ALWR, UTNW(Or &Wa), ALPA, UTPA, UTTX]

SAs used in analysis: **80**

Dial Equipment Minutes
Data Source: NECA filed statistics on network usage by carrier

Study Areas reconciled:

Total SAs per NECA data filing:	131
Less:	
SAs combined to agree with access line data:	(10)

Study Area(s)	Combined with:
COCA	GTCA
MSID	PNID
CBTC (KY)	CBTC (Ohio)
PRCC	PRPR
COTX	GTTX
COIL	GTIL
COIN	GTIN
COMO	GTMO
CONC	GTNC
UTIN(Va)	UTIN(Tn)

SAs removed (not in ARMIS reporting): (4)
(GA Alltel Telecom, Micronesian Tel, GTE No. Inc. - MN, Citizens Utilities DBA Citizens of Tennessee)

SAs removed (certified rural) (37)
[GTSW(Ar), COAZ, GNCA, COIA, COSI, GTIA. GTNW (Id), ALGC, GTSO(Il & Va), COKY, COCM, COEM, COSO (Mi & In), UTIN, UTMO, GTNE, CONM, GTNM, CONV, CTUP, CTWC, CTRH, ALNC, UTNJ, ALWR, ALPA, COPA, COQS, UTPA, COSC, UTNW(Or &Wa), UTTX, COVA, COWA]

SAs used in analysis: 80

Industry- Nonrural

1998 Expense to Investment (E/I) Ratio Development

Industry Maintenance Ratios (source: ARMIS 43-03 Report)			Investment - YE97 per ARMIS (000)	Investment - YE97 C/B ratio	Investment - YE97 Current (d x e)	Investment - YE98 per ARMIS (000)	Investment - YE98 C/B ratio	Investment - YE98 Current (g x h)	Average Current (f + i)/2	1998 Expense (000)	E/I Ratios (k/j)
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
6110	2112-16	Network Support Investment	4,700,903	1.1092	5,214,143	4,901,282	1.0213	5,005,640	5,109,891	141,195	0.0276
6120	2121-24	General Support Investment	32,132,798	1.5607	50,150,265	32,444,408	1.4917	48,398,223	49,274,244	4,462,289	0.0906
6212	2212	COE (Digital)	50,313,162	0.8835	44,451,295	54,462,719	0.9012	49,080,593	46,765,944	2,608,532	0.0558
6232	2232	Circuit - DDS	465,677	0.9900	461,001	460,401	0.9703	446,718	453,859	7,536	0.0166
6232	2232	Circuit - other than DDS	55,866,666	0.9609	53,682,242	60,952,146	0.9602	58,527,901	56,105,071	1,120,732	0.0200
6411	2411	Poles	5,662,911	2.4160	13,681,515	5,792,336	2.3879	13,831,347	13,756,431	300,722	0.0219
6421	2421	Aerial Cable - metallic	28,212,976	1.5262	43,057,416	29,214,581	1.5178	44,342,673	43,700,044	2,923,762	0.0669
6421	2421	Aerial Cable - fiber	1,956,347	0.8575	1,677,481	2,193,458	0.8777	1,925,145	1,801,313	13,179	0.0073
6422	2422	Underground Cable - metallic	20,715,449	1.6937	35,086,326	21,203,054	1.6412	34,798,025	34,942,175	732,205	0.0210
6422	2422	Underground Cable - fiber	5,214,779	0.8176	4,263,645	5,566,472	0.8310	4,625,601	4,444,623	37,328	0.0084
6423	2423	Buried Cable - metallic	45,082,685	1.3750	61,989,823	47,278,378	1.3680	64,676,810	63,333,317	2,825,519	0.0446
6423	2423	Buried Cable - fiber	3,342,971	0.9521	3,182,770	3,693,661	0.9676	3,573,892	3,378,331	20,741	0.0061
6441	2441	Conduit Systems	16,906,837	1.8787	31,762,146	17,435,059	1.8049	31,467,861	31,616,004	182,469	0.0058

Note: Current to book (C/B) ratios are composites of proprietary data supplied by Ameritech, Bell Atlantic, BellSouth, GTE, and SBC.

Common Support Service Expenses

Results of Regression Equations and Calculations of Expense Inputs

I. Regression Equation Results for Common Support Service Expenses

ARMIS Account ($ 000's per year)	Switched/Total Access Lines Coefficient	Std Error	t-stat	P> |t|	Special/Total Access Lines Coefficient	Std. Error	t-stat	P> |t|
6510 Other Property, Plant & Equipment	-0.000572639	0.00052691	-1.086783411	0.280522946	-0.0017271	0.000825	-2.09311	0.039632
6530 Network Operations	0.018205306	0.00500883	3.634643863	0.000500323	0.01298475	0.007844	1.655447	0.101904
ADJUSTED 6530 Network Operations (-2.6%)	0.017731968	0.0048786	3.634643863	0.000500323	0.01264715	0.00764	1.655447	0.101904
6610 Marketing*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
6620 Service Expense/Customer Operations	0.043462398	0.00588854	7.380845964	0.0000	0.0029899	0.009221	0.32424	0.746636
6700 Executive, Planning, General & Administrative	0.032645467	0.01149648	2.839604666	0.005774753	0.00643305	0.018003	0.35733	0.721822
ADJUSTED 6700 Executive, Planning, General & Administrative (-20%)	0.026116374	0.00919719	2.839604666	0.005774753	0.00514644	0.014402	0.35733	0.721822

ARMIS Account ($ 000's per year)	Toll DEMS/Total Access Lines Coefficient	Std. Error	t-stat.	P> |t|	R-Squared	Adjusted R-Squared	F-stat.	Prob > F	Standard Error	# of Obs.
6510 Other Property, Plant & Equipment	0.00020989	8.7333E-05	2.40335582	0.018651	0.2000	0.1689	6.418	0.00061	0.00072	80
6530 Network Operations	0.00262234	0.00083019	3.15873128	0.002264	0.9512	0.9493	500.2	0.00	0.0068	80
ADJUSTED 6530 Network Operations (-2.6%)	0.00255416	0.0008086	3.15873128	0.002264	0.9512	0.9493	500.2	0.00	0.00662	80
6610 Marketing*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	80
6620 Service Expense/Customer Operations	0.0007122	0.000976	0.729721	0.467775	0.9636	0.9622	680.04	0.00	0.00799	80
6700 Executive, Planning, General & Administrative	0.00515239	0.00190548	2.70398172	0.008429	0.9211	0.9180	299.69	0.00	0.01561	80
ADJUSTED 6700 Executive, Planning, General & Administrative (-20%)	0.00412191	0.00152439	2.70398172	0.008429	0.9211	0.9180	299.69	0.00	0.01249	80

* Marketing input calculated using weighted average of Acct 6613 Product Advertising (See Common Support Service Expenses Appendix Table V).

II. Per- Line Per-Month Common Support Service Input Calculations

ARMIS Account	Switched Line Expenses/Total Lines Estimate (000's)	$ per year	$ per month	Input Value	EXPENSE INPUTS
6510 Other Property, Plant & Equipment	-0.000572639	-0.572639	-0.0477199	$ (0.05)	**$ (0.05)**
6530 Network Operations	0.018205306	18.20531	1.51710887	$ 1.52	
ADJUSTED 6530 Network Operations (-2.6%)	0.017731968	17.73197	1.47766404	$ 1.48	**$ 1.48**
6610 Marketing**	0.00111347	1.11347	0.09278916	$ 0.09	**$ 0.09**
6620 Service Expense/Customer Operations	0.043462398	43.4624	3.6218665	$ 3.62	**$ 3.62**
6700 Executive, Planning, General & Administrative	0.032645467	32.64547	2.72045559	$ 2.72	
ADJUSTED 6700 Executive, Planning, General & Administrative (-20%)	0.026116374	26.11637	2.17636447	$ 2.18	**$ 2.18**
				TOTAL	**$ 7.32**

** See Common Support Service Expenses Appendix Table V for derivation of Marketing Expense Input

Common Support Service Expenses
Results of Regression Equations Including Local DEMS

III. Regression Equation Results for Common Support Service Expenses Including Local DEMS

ARMIS Account	Switched/Total Access Lines				Special/Total Access Lines				Toll DEMS/Total Access Lines				Local DEMS/Total Access Lines					F-stat	Prob > F	Standard	# of
($ 000's per year)	Coefficient	Std Error	t-stat	P> |t|	Coefficient	Std Error	t-stat	P> |t|	Coefficient	Std Error	t-stat	P> |t|	Coefficient	Std Error	t-stat	P> |t|	R-Squared			Error	Obs
6510 Other Property, Plant & Equipment	-0.000638228	0.00068	-0.938035283	0.35118782	-0.001764065	0.000864503	-2.04055348	0.04476864	0.00021261	8.96543E-05	2.371483454	0.020249987	3.5962E-08	2.34E-06	0.153850	0.878129	0.2003	4.758	0.00177	0.0007190	80
6530 Network Operations	0.014914246	0.006441	2.31563918	0.023277319	0.011128875	0.008183521	1.359912792	0.17787817	0.0027589	0.000848882	3.250809401	0.001718343	0.00018045	0.000221	0.815558	0.417303	0.9518	373.7	0.00	0.0088144	80
ADJUSTED 6530 Network Operations (-2.6%)	0.014526478	0.006273	2.31563918	0.023277319	0.010839524	0.00797075	1.359912792	0.17787817	0.00268717	0.000826816	3.250809401	0.001718343	0.00017576	0.000218	0.815555	0.417303	0.9518	373.7	0.00	0.0086372	80
6610 Marketing*	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	80
6620 Service Expense/Customer Operations	0.032559893	0.007338	4.438985847	0.0000	-0.003158303	0.009324038	-0.338726955	0.7357495	0.00116482	0.000966981	1.204408053	0.232169381	0.00059778	0.000252	2.371308	0.020250	0.9881	880.04	0.00	0.0078830	80
6700 Executive, Planning, General & Administrative	0.049769384	0.014513	3.429372949	0.005774753	0.016089491	0.018439848	0.872539228	0.38568265	0.00444183	0.001912327	2.322735981	0.022871578	-0.0009389	0.000499	-1.88323	0.063495	0.8246	233.1	0.00	0.0153548	80
ADJUSTED 6700 Executive, Planning, General & Administrative (-20%)	0.039815507	0.01161	3.429372949	0.005774753	0.012871593	0.014751878	0.872539228	0.38568265	0.00355346	0.001529861	2.322735981	0.022871578	-0.00075112	0.000399	-1.88323	0.063495	0.8246	233.1	0.00	0.0122838	80

* Marketing input calculated using weighted average of Acct 6613 Product Advertising (See Common Support Service Expenses Appendix Table V)

IV. Estimates of Per- Line Per-Month Common Support Service Input Calculations with Local DEMS in Regression

ARMIS Account	SwitchedLine Expenses/Total Lines				Local DEMS Expense/Total Lines					Switched Line	Local DEMS	Combined	EXPENSE
	Estimate (000's)	$ per year	$ per month	Input Value	Estimate (000's	Wgtd Avg	Local Est (000's	$ per year	$ per month	Input Value	Input Value	Input Value	INPUTS
6510 Other Property, Plant & Equipment	-0.000638228	-0.638228	-0.053185678	$ (0.05)	3.59872E-06	13.992902	5.03210E-05	0.05032181	0.00419347	$ (0.05)	0.004193487	$ (0.04)	$ (0.04)
6530 Network Operations	0.014914246	14.91425	1.242853841	$ 1.24	0.000180448	13.992902	0.002524988	2.52498572	0.21041548	$ 1.24	0.210415477	$ 1.45	
ADJUSTED 6530 Network Operations (-2.6%)	0.014526478	14.52648	1.210539842	$ 1.21	0.000175756	13.992902	0.002459338	2.45933809	0.20494487	$ 1.21	0.204944874	$ 1.42	$ 1.42
6610 Marketing**	1.11348892	0.092789	0.09	$ 0.09	#N/A	#N/A	#N/A	#N/A	#N/A	$ 0.09	#N/A	#N/A	$ 0.09
6620 Service Expense/Customer Operations	0.032559893	32.55989	2.713307764	$ 2.71	0.000597791	13.992902	0.008364834	8.36483415	0.69706951	$ 2.71	0.697068512	$ 3.41	$ 3.41
6700 Executive, Planning, General & Administrative	0.049769384	49.76938	4.147448643	$ 4.15	-0.000938898	13.992902	-0.013137907	-13.137907	-1.0948256	$ 4.15	-1.094825581	$ 3.05	
ADJUSTED 6700 Executive, Planning, General & Administrative (-20%)	0.039815507	39.81551	3.317958914	$ 3.32	-0.000751118	13.992902	-0.010510326	-10.510326	-0.8758605	$ 3.32	-0.875860465	$ 2.44	$ 2.44
												TOTAL	$ 7.31

** See Common Support Service Expenses Appendix Table V for derivation of Marketing Expense Input

V. CALCULATION AND ANALYSIS OF USF HIGH COST EXPENSE INPUT - MARKETING 1998

Verification of ETI Alternative

ETI Table 4A	Account	1992 MA COSS ETI Tables 4A, 4B Advertising $ (000's)	1998 Preliminary Statistics of Common Carriers (Table 2.10) Percent of Line Type	Portion $ (000's)			
Primary Res	6613 2	3935938	0.8435	3319963.703	Primary	20302230	Total Adv $ (000's) on all lines
Single Line Bus	6613 1	4275050	0 078	333453.9	SLB		
				3653417 603	Total	0.179951542	18% Share for Primary & Single Line (SLB) Business Lines
						3653417 603	Verified

FCC REVISED ETI Table 4A to Include Multi-Line Businesss Advertising

Multi-Line Bus	6613.1	4275050	0.7999	3419612.495	Analog MLB		
Single Line Bus	6613.1	4275050	0.078	333453.9	Analog SLB		
Total Business			0.8779	3753066.395	Total Businesss (Analog)		
				7073030.098	Primary +ALL Busines	0.348386857	34.84% Share for Primary, SLB and Multiline Business

Total USF HIGH COST COSA Advertising Account 6613 from ARMIS 43-03 1998

Expense ($000's)	Portion Supported	Supported Expenses	Total Lines (000's)	Advertising per Line		Yr. Cost Per Line	Per Line Per Month		
640908	0.348386857	223283.9237	200529821	0.001113	1000	1.1134699	0.0927892	$ 0.09 Per Line/Per Month	34.84% of Advertising from ARMIS 43-03 1998 Primary,SLB,MLB No Product Management or Sales

Advertising at 34.84% of Advertising represents % of Total USF HIGH COST COSA Marketing Costs - ARMIS 1998

223284	3835512	0.058214894	5.82%	USF Advertising Allocation represents % of Total Marketing Costs

FCC REVISED ETI Table 2 with 34.84% of Advertising to include Mutl-line Business (SOCC 1998 Expense Figures)

Product Management	1666529	0 16	266644 64				
Sales	2611045	0	0				
Advertising	803998	0 3484	280112 9032				
			546757 5432	5081572	0.107596142	10.76%	If include Product Mangement

FCC REVISED ETI TABLE 2 with 34.84% Advertising and EXCLUDE Product Management and Sales (SOCC 1998 Figures)

Product Management	1666529	0	0				
Sales	2611045	0	0				
Advertising	803998	0 3484	280112 9032				
			280112 9032	5081572	0 055123277	5.51%	If include only 34% of Advertising using SOCC 1998 figures

ETI Alternative Adjustment 1 using ARMIS 1998 Total Marketing ($000's)

3835512	0.0809	310292.9208	200529821	0 001547365	1000	1 54736547	0.128947123	$ 0.13	8.09% of ALL Marketing Includes: 18% Res Product Mgmt 18% of Adv Primary + SLB

ETI Alternative Adjustment 2 using ARMIS 1998 Total Marketing ($000's)

3835512	0. 107596142	412686 2943	200529821	0 00205798	1000	2 057979667	0.171498306	$ 0.17	10.76% of ALL Marketing (Includes: 34.84% of Adv

Source Comparisons for reference only:

$ (000's)	Product Management	Sales	Advertising	Total Marketing	
USF High Cost	1186059	2008540	640908	3835512	ARMIS 43-03 1998
SOCC 1998	1666529	2611045	803998	5081572	Preliminary Statistics of Common Carriers 1998
Difference	-480470	-602505	-163090	-1246060	

Local Number Portability

(cents per month)

Ameritech	$0.28
BA/NYNEX	$0.23
BellSouth	$0.35
Pacific Bell	$0.34
Southwestern	$0.33
US West	$0.43
GTE	$0.36
Sprint LTCs	$0.48
Cincinnati Bell	$0.34
Nationwide Line-weighted Avg.	$0.32

General Support Facilities

Investment Calculation

$$\begin{bmatrix}\text{Office}\\ \text{Worker}\\ \text{GSA}\end{bmatrix} = \frac{\dfrac{\text{SW}}{\text{TOTAL}}\begin{bmatrix}\text{Loop}\\ \text{Main.}\end{bmatrix} + \dfrac{\text{SW}}{\text{TOTAL}}\begin{bmatrix}\text{Circuit}\\ \text{Main.}\end{bmatrix} + \dfrac{\text{Local DEM}}{\text{Total DEM}}\begin{bmatrix}\text{Switch}\\ \text{Main.}\end{bmatrix} + \text{USF Corp.}}{\left[\text{Loop Main.} + \text{Circuit Main.} + \text{Switch Main.} + \text{Total Corp.}\right]}$$

$$.6769 = \frac{.8225(2.99) + .8225(.45) + .7438(1.38) + 7.32}{2.99 + .45 + 1.38 + 11.69}$$

Office Worker GSA = .6769

Total Operation GSA = 1 - .6769 = .3231

GSA = General Support Allocation
SW = Switched Lines
TOTAL = Total Lines
Main. = Maintenance
Corp. = Expenses Related to Part 32 Accounts 6510, 6530, 6600, 6700

APPENDIX E:
Parties Filing Comments and Reply Comments

PARTIES FILING COMMENTS IN RESPONSE TO THE HIGH-COST INPUTS FNPRM
CC Dkt. 96-45/97-160
7/23/99

Commenter	Abbreviation
Alaska Telephone Association	ATA
Aliant Communications Co.	Aliant
ALLTEL Communications Services Corp.	ALLTEL
Ameritech	Ameritech
AT&T Corp. and MCI Worldcom, Inc.	AT&T/MCI
Bell Atlantic	Bell Atlantic
BellSouth Corporation	BellSouth
Bentleyville Telephone Company	BTC
CenturyTel, Inc.	CenturyTel
Cincinnati Bell Telephone Company	Cincinnati Bell
Citizens Utilities Company	CUC
Commonwealth Telephone Company	Commonwealth
General Services Administration	GSA
GTE Service Corporation	GTE
GVNW Consulting, Inc.	GVNW
Matanuska Telephone Association	MTA
Nebraska Public Service Commission	Nebraska PSC
National Exchange Carriers Association	NECA
Puerto Rico Telephone Company	PRTC
Rural Telephone Coalition	RTC
SBC Communications Erratum (8/3/99)	SBC
Skyline Telephone Membership Corporation	Skyline
South Slope Cooperative Telephone Company	South Slope
Sprint Corporation	Sprint
TXU Communications Telephone Company	TXU
United States Telephone Association	USTA
U S WEST, Inc.	USWEST
Western Alliance	
Virgin Islands Telephone Corporation	Vitelco
Yukon Telephone Company, Inc.	

APPENDIX E:
Parties Filing Comments and Reply Comments

PARTIES FILING REPLIES IN RESPONSE TO THE HIGH-COST INPUTS FNPRM
CC Dkt. 96-45/97-160
8/6/99

Reply Commenter	Abbreviation
AT&T Corp. & MCI WorldCom, Inc.	AT&T/MCI
Bell Atlantic Telephone Companies	Bell Atlantic
BellSouth Corporation	BellSouth
Florida PUC	Florida
General Services Administration	GSA
GTE Service Corporation	GTE
PNR and Associates	PNR
Roseville Telephone Company	Roseville
Rural Telephone Coalition	RTC
Sprint Corporation	Sprint
TXU Communications Telephone Company	TXU
United States Telephone Association	USTA
U S West, Inc.	US West
Virgin Islands Telephone Corporation	Vitelco
West Virginia Consumer Advocate	

Separate Statement of
Commissioner Gloria Tristani

Re: *Federal-State Joint Board on Universal Service; Ninth Report & Order and Seventeenth Order on Reconsideration. CC Docket No. 96-45*

Federal-State Joint Board on Universal Service; Forward-Looking Mechanism for High Cost Support for Non-Rural LECs. CC Docket Nos. 96-45 & 97-160.

In adopting these Orders, the Commission has taken an important step towards fulfilling its mandate under the 1996 Act to ensure that all Americans have access to telecommunications and information services. The new high-cost mechanism, together with the selected inputs, establishes a specific, predictable, and sufficient mechanism to preserve and advance universal service. I believe that the mechanism will provide sufficient resources to the states to ensure reasonable comparability of rates among states. Moreover, I am pleased that the Commission will be ready to provide forward-looking support to non-rural carriers based on this mechanism, effective January 1, 2000.

I commend my fellow Joint Board members, the Joint Board staff, and the Common Carrier Bureau for their outstanding cooperation in developing the model and model inputs. I likewise commend the outside parties who worked with the Joint Board and the Bureau throughout this process. I look forward to continued cooperation as we confront the other pieces of universal service reform, including adjusting interstate access charges to account for explicit support, selecting an appropriate methodology for rural carriers serving high cost areas, and addressing the needs of unserved and underserved areas.

DISSENTING STATEMENT OF COMMISSION FURCHTGOTT-ROTH

Re: *Federal-State Joint Board on Universal Service*, Ninth Report & Order and Eighteenth Order on Reconsideration, CC Docket No. 96-45; *Federal-State Joint Board on Universal Service, Forward-Looking Mechanism for High Cost Support for Non-Rural LECs*, Tenth Report and Order, CC Docket Nos. 96-45, 97-160.

In the companion orders that it releases today, the Commission finalizes its implementation of a computer model that it will use to determine the total cost of providing service to every resident in the country. It plans to use this model to distribute universal service support among "non-rural carriers," the term that is used to describe the large telephone companies that serve rural areas. As I have said at earlier stages in this proceeding, this Commission's approach to universal service is fundamentally at odds with the Telecommunications Act generally and specifically with its express directive that the Commission "preserve and advance" universal service. Moreover, its adoption of this unwieldy model is inconsistent with the Act's mandate that universal service support be "specific" and "predictable." Finally, as a consequence of the Commission's action today, consumers will now pay higher bills for dubious subsidies to large companies. I therefore dissent from these orders.

The Orders Are Inconsistent With Congress's Objective of Preserving Universal Service Support for Rural Carriers. By way of background, four years ago, universal service was a $2 billion per year program targeted mostly at small, rural telephone companies. Today, as a result of the Commission's unwarranted interference in the existing universal service system and the new programs that it has dreamed up, the program costs taxpayers more than $5 billion a year.

I believe that this proceeding illustrates, yet again, that this Commission has its universal service priorities entirely backward. Section 254 of the Telecommunications Act of 1996 was drafted with rural carriers in mind. The primary objective of that provision was to ensure that rural carriers continued to receive sufficient funding to enable them to provide local service at rates comparable to those in urban areas. In light of this objective, the Commission should have turned first to the matter of preserving rural universal service. Instead, the Commission has squandered a tremendous amount of its employees' time and taxpayers' money coming up with an entirely new approach to universal service. And the matter of universal service support for rural carriers has been this Commission's very last priority.

I am relieved to see that the Commission has in these orders taken steps to ensure that funding for rural carriers will not decrease – at least in the near term. I have little confidence, however, that rural carriers can count on this promise for long. This Commission has so substantially increased universal service funding for other, less essential programs that, if and when it finally turns to addressing the issue of rural universal service support, I question whether there will be any money left for rural telephone companies.

The Commission's Model Is Unwieldy, Easily Manipulated, and Will Require Constant Maintenance. Not only does the Commission have its universal service priorities wrong, but also the model on which it relies is inconsistent with the Telecommunications Act's requirement that universal service support be "specific" and "predictable." The model is an immensely complicated computer program that requires around 180 hours – more than one week – to run. Since issuing an October 1998 NPRM in which it proposed this model, the Commission has made numerous changes to the model platform, and each change has required interested parties to go back to their computers and spend days testing the model. Only in the last few weeks has the Commission decided on final input values. In my view, it is unclear whether interested parties have even had the opportunity meaningfully to comment on a final version of the model, as the Administrative Procedure Act requires.

The model is also completely dependent on hundreds of assumptions about the local exchange markets and costs. The bottom line is that, simply by making different assumptions about local exchange networks, or by picking different input values for costs, the Commission is able to push the end result in whatever direction it chooses. I do not believe that a system that can be manipulated in this way will generate the "specific" and "predictable" universal service support that the 1996 Act requires. In addition, the fact that the Commission has found it necessary to tinker with this model so extensively reflects its fundamental lack of confidence in its model.

The model is also going to be enormously time-consuming and expensive to maintain. Each time technology or prices change, the Commission's staff will be required to adjust the model. I am opposed to wasting resources on this effort.

The Commission's Approach to Universal Service Means that Consumers Will Pay More. As a final matter, I want to point out what the Commission's current approach to high-cost universal service will mean for consumers. According to the model, carriers in a few states (primarily Mississippi and Alabama) should receive significantly more funding than they currently do, and the Commission plans to increase subsidies for carriers in these states. But the model also says that carriers in many other states should receive *less* universal service funding than they now do. The Commission, however, does not plan to follow the model's guidance with respect to these carriers. Instead, because it committed to Congress in April 1998 that universal service support would not decrease for any state, the Commission plans to continue distributing current levels of universal service support to carriers in all states.

The result of this so-called "hold harmless" requirement is that all carriers will receive as much or more universal service funding as they did before the issuance of these two orders. In other words, the bill for high-cost universal service support will go up, and consumers' phone bills are going to increase correspondingly. I predict that these will be only the first of several increases that consumers can expect to see in the upcoming months as a result of this Commission's misguided universal service policies.